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STATISTICAL BULLETIN
Metropolitan Life Insurance Co.

VOL. X JULY, 1929 No. 7

THE NATURAL INCREASE OF THE AMERICAN POPULATION

Now that the restrictive laws have all but eliminated immigration as a source of national growth, what are the fundamental facts as to the natural increase of our people? How are our births and deaths balanced? What is the outlook for future increase? These are some of the many questions on population which are uppermost in the minds of all interested in the welfare of the country. More and more, public attention centers around the population problem. Conferences, national and international, are bringing home to intelligent people everywhere the fact that these questions must be correctly answered before we can grapple with the solution of a host of other national problems.

With the hope of throwing light on these questions, Drs. DUBLIN and LOTKA, of the Metropolitan Life Insurance Company, in 1925 published the results of their researches into what they called the true rate of natural increase. The main point they made was that the usual method of calculating natural increase, namely, of considering only birthrates and deathrates, gave a misleading impression, and that the truly characteristic rate of natural increase of our population must be calculated in another manner. Obviously, the current birthrate depends upon the proportion of women in the principal childbearing age groups in the present population. It is a matter of common knowledge that this proportion in the American population is relatively high, owing to two circumstances, namely, first, the heavy immigration of young persons in past years; and, second, the higher birthrates which prevailed in previous generations. For, the persons thirty years old today, for example, are survivors out of a *relatively* larger batch of births than are persons ten years old, who were born at a time of more recent, and therefore lower, birthrates. Thus the effect of the great decline in the birthrate which has occurred during the last thirty-five years or more has

been to accentuate the proportion of childbearing women in the present population. It is a curious fact that a steadily falling birthrate thus tends reflexly to increase the birthrate for the time being above that value which actually corresponds to the prevailing fertility of the reproducing strata of our population. It is as if a brake were automatically applied to the toboggan, with the result, however, only of slowing its descent, not arresting it altogether. There thus results not only a deceptively high birthrate, but, at the same time, a deceptively low deathrate, for the concentration of young adults, who have a relatively low mortality, tends to depress the general deathrate.

The net result of the researches mentioned above was to show clearly how the present abnormally high proportion of persons in the middle registers of life would gradually disappear and the population would then settle down to a state in which, *even with no further diminution in the prevailing fertility*, the natural rate of increase would come down to about five per 1,000 or only about one-half of the figure observed in 1920, the year to which the original study related. This, then, was the natural rate of increase which truly represented the resultant of present fertility and mortality.

So important a conclusion and one so full of practical implications required confirmation and Dr. DUBLIN and Dr. LOTKA have brought up to date their study of the true rate of natural increase insofar as recent figures are available. Their calculations show that, for the year 1925, the true rate of natural increase of the white population is just a little lower than that computed for the year 1920, namely, 5.3 per 1,000 per annum, as against 5.5 in the earlier year. Data for the years 1926, 1927 and 1928 are available only in provisional form, and computations are somewhat more indirect and not quite so reliable. Allowing for this, the true rate of natural increase for the years 1926, 1927 and 1928 is found to be 3.9 and 4.6 and 2.3, respectively, per 1,000 per annum. The corresponding excess of births over deaths, which we ordinarily speak of as the natural rate of increase, was 8.6, 9.2 and 7.8, respectively, for 1926, 1927 and 1928, so that the true rate is now less than one-third the uncorrected rate. The decrease which thus has taken place since 1920 would have been materially greater but for the fact that the reduction of fertility in this period has been largely counterbalanced by the concurrent improvement in mortality, especially among children. We cannot, however, be assured that, in the future, reduction in mortality will keep pace with the continuing fall in fertility.

In fact, we can be very certain that the current mortality rate will not be much further reduced.

We find ourselves thus confronted with a remarkable conclusion, which should materially affect our point of view with regard to the population problem. For we are much nearer to the conditions for a stationary population than we had realized. It is true that a number of years may elapse before we have exhausted the reserves laid up by virtue of past high birthrates and past immigration. In the meantime, fertility continues on the down grade, with no indication in sight that the decline will be arrested when the dead point is reached, when further decrease in mortality to offset the losses in fertility becomes difficult or impossible; when, therefore, there is danger that the natural rate of increase of the American population may give place to a natural rate of decrease.

Those who are responsible for shaping our governmental policy, whether it be with reference to the opening and the development of our public domain, the growth of our cities, or the extension of our railroads and other methods of transportation, with water supplies and other utilities which must ordinarily be provided for long in advance, will do well to give consideration to these important facts.

MORTALITY EXPERIENCE OF THE FIRST SIX MONTHS OF 1929

Nineteen hundred and twenty-nine began badly from the standpoint of public health. The unfavorable first quarter, nevertheless, was followed by an excellent second quarter. In fact, the first three months, with a single exception (in 1920), had the worst health record we have experienced during the current decade, whereas the April to June period had the best, with only one exception (1921). Unless there is a setback during the latter part of the year, 1929 will be recorded as one of the best health years we have ever enjoyed. These statements are based upon the mortality experience of a group of approximately nineteen million people, the Industrial policyholders of the Metropolitan Life Insurance Company in the United States and Canada. The health record of this large cross section of the population, in past years, has always proved to be an accurate, as well as the earliest, index of what is happening in the general population of these two countries.

The high deathrate in January, February and March was due, almost entirely, to an outbreak of influenza. This was responsible

not only for very high mortality from that disease and from pneumonia, but for the premature deaths of thousands of persons who had chronic diseases, such as organic heart disease, cerebral hemorrhage, tuberculosis and diabetes.

The Epidemic Diseases of Childhood

The measles deathrate during the first half of 1929 was approximately one-half that for the corresponding period of last year; the mortality from scarlet fever showed a considerable drop, and that for diphtheria a pronounced decline. There is every prospect that, when the record for 1929 is completed, a new minimum will be registered for diphtheria mortality. The earnest campaign which has been conducted for the immunization of children against this disease is bearing fruit.

Influenza and Pneumonia

The influenza deathrate during the second quarter of 1929 was only 22.6 per 100,000, as compared with 122.3 in the first quarter when the latest influenza outbreak was at its height. The pneumonia deathrate dropped so sharply in the second quarter that, at the completion of the half-year, the cumulative deathrate was only slightly above that for the corresponding period of 1928.

Tuberculosis Shows Marked Improvement

The deathrate for tuberculosis during the first half of 1929 was unprecedentedly low for this part of any year. The rate for white policyholders was only 73.6 per 100,000. This marks a decline of 3.3 per cent. over the record for January-June, 1928. There was, also, a 7.8 per cent. drop for the colored insured. These new declines have taken place despite the influenza outbreak which was responsible, during the first quarter, for hastening the deaths of large numbers of tubercular patients. It is now assured, almost beyond peradventure, that the end of 1929 will see another new minimum mortality figure for tuberculosis in the United States and Canada; and that this figure will be well below the former low point established only last year.

No Improvement for Cancer

The cancer deathrate increased very slightly among white policyholders and dropped a little among the colored; the composite rate for both races was 76.2 per 100,000, as compared with 76.0 in the

first half of 1928. The chief interest attaching to this fractional increase is that it again confirms what has been pointed out in these BULLETINS year after year, namely, that no progress is being made in the control of cancer. The year-to-year increase in the deathrate has been small, but persistent.

The "Degenerative" Diseases

The combined deathrate for the three principal "degenerative" conditions (heart disease, chronic nephritis and cerebral hemorrhage) rose slightly as compared with the first half of last year. This was due entirely to an increase for heart disease.

The Diabetes Deathrate Continues to Rise

The deathrate from diabetes is steadily increasing in the industrial populations of the United States and Canada. The rise is unmistakable and obtains for both the white and colored population. It is taking place despite the use of insulin which has prolonged the lives of thousands of diabetics. As we noted in the May, 1929, STATISTICAL BULLETIN, it is our judgment that diabetes is on the increase because of the dietary excesses of the American people.

Deathrates from Alcoholism, Cirrhosis of the Liver and Acute Alcoholic Poisoning Are All Increasing

Alcoholism, exclusive of acute poisoning by wood or denatured alcohol, was the reported cause of death of 321 Metropolitan Industrial policyholders during the first six months of 1929. This number corresponds to a deathrate of 3.4 per 100,000, and marks an increase over the corresponding period of last year, when there were 284 deaths and a deathrate of 3.1.

The deathrate from alcoholism continues to run much higher in the industrial population of the United States than among Canadian wage-earners. This has always held true—both before and since National Prohibition. Of the 321 deaths from alcoholism, so far this year, only six affected Canadian policyholders, who number approximately one and one-quarter millions. Since January 1, 1922, a period of seven and one-half years, there occurred 3,818 deaths from alcoholism among Metropolitan Industrial policyholders. Only 43 of these were deaths of Canadians.

Six hundred and fifteen deaths were reported from cirrhosis of the liver, which is closely associated with alcoholism. The deathrate was 6.6 per 100,000. During the like period of 1928 there

Deathrates per 100,000 Exposed. First Six Months of 1927, 1928 and 1929 Compared. By Color for Principal Causes of Death. Industrial Department, Metropolitan Life Insurance Company, Weekly Premium Paying Business

CAUSE OF DEATH	DEATHRATES PER 100,000 PERSONS EXPOSED					
	WHITE			COLORED		
	Jan. to June, 1929	Jan. to June, 1928	Jan. to June, 1927	Jan. to June, 1929	Jan. to June, 1928	Jan. to June, 1927
ALL CAUSES OF DEATH	934.4	896.2	870.2	1,655.5	1,611.0	1,544.5
Typhoid fever	1.4	1.7	4.3	3.4	2.7	6.5
Measles	4.9	8.7	7.2	1.9	8.1	3.6
Scarlet fever	3.7	4.0	4.5	1.1	1.7	1.4
Whooping cough	5.8	5.8	7.0	9.9	8.7	9.4
Diphtheria	10.0	12.2	12.0	6.3	6.2	6.7
Influenza	63.4	28.4	22.0	128.5	61.8	52.5
Meningococcus meningitis	5.4	2.2	1.3	9.3	2.9	1.8
Tuberculosis—All forms	73.6	76.1	81.6	222.4	241.2	238.2
Tuberculosis of respiratory system	65.2	66.7	71.4	197.9	211.2	208.9
Tuberculosis of meninges, etc.	3.9	4.4	5.1	4.7	8.1	7.4
Other forms of tuberculosis	4.5	5.0	5.2	19.9	21.9	21.9
Cancer	76.4	75.9	75.6	75.2	76.9	71.9
Diabetes	20.3	18.8	17.6	22.3	21.3	19.5
Alcoholism	3.1	2.8	3.2	5.4	5.3	5.0
Cerebral hemorrhage; apoplexy	54.4	54.2	52.3	105.1	103.9	97.9
Organic diseases of the heart	148.6	140.7	132.0	255.7	238.4	218.0
Total respiratory diseases	124.7	120.9	104.3	226.2	242.5	210.3
Bronchitis	4.5	4.8	4.7	5.9	7.2	8.1
Bronchopneumonia	47.7	45.1	39.8	68.5	81.5	68.2
Pneumonia—Lobar & Undefined	63.5	62.0	51.7	138.2	140.4	122.3
Other dis. of respiratory system	9.0	8.9	8.2	13.6	13.4	11.8
Diarrhea and enteritis	13.9	15.8	16.8	15.0	17.4	19.7
Under 2 years	11.2	12.9	13.5	8.9	12.0	13.4
2 years and over	2.8	2.9	3.2	6.1	5.3	6.3
Acute nephritis	3.8	4.2	4.0	13.1	13.0	15.3
Chronic nephritis	65.9	67.7	67.1	127.4	135.5	129.9
Total puerperal state	13.0	13.7	14.8	21.9	20.9	25.6
Puerperal septicemia	4.6	4.8	6.0	9.4	9.2	13.4
Puerperal albuminuria and convulsions	2.7	3.1	2.8	5.3	3.6	4.6
Other dis. of puerperal state	5.6	5.8	6.0	7.2	8.1	7.5
Total external causes	68.6	66.9	69.3	106.0	104.5	115.8
Suicides	9.1	8.7	8.7	6.4	6.2	7.0
Homicides	2.8	2.8	3.2	28.9	30.4	36.7
Accidental and unspecified violence	56.6	55.4	57.4	70.7	67.8	72.1
Accidental drowning	4.9	4.9	4.6	3.4	4.1	6.5
Automobile accidents	17.0	15.3	15.3	15.4	16.5	14.7
All other and ill-defined causes of death	173.3	175.2	173.4	299.6	298.3	295.4

were 578 deaths, with a rate of 6.3. Deaths from acute poisoning by wood or denatured alcohol are of little importance numerically, but have lately been showing a tendency to increase.

Fewer Deaths from Puerperal Conditions

It would not have been surprising, in view of last winter's influenza epidemic, if a rise had been recorded for the first half of 1929 in deaths from puerperal diseases. As a matter of fact, the mortality did increase during the first quarter, but gains in the April-June period have more than counterbalanced this, and there is good prospect that 1929 will establish a new minimum deathrate for these diseases. The low point, so far, was recorded only last year.

Suicides, Accidents, Automobile Fatalities, Increase

The deathrates for suicides and accidents ran a little higher than in the first half of 1928. The rate for automobile fatalities has increased 9.1 per cent. The mortality from this cause, after showing a continuous increase for almost two decades, registered a small drop for the full year 1928. It was hoped that the maximum had been reached, and that the concerted efforts of police, safety and insurance interests had at last turned the tide. The latest data indicate that the improvement of last year was only transitory.

THE CHANCES OF MARRIAGE

What are the chances that a young man, twenty years of age and single, will be alive and married within five years? Or within ten years? And what are the corresponding chances for a young woman of twenty, or of twenty-five, or any other age? The answer to these and similar questions is to be found in the graph on page 9. So, for example, we find that, for a young man of twenty, the chance that he will survive to the end of another five years and be married some time within this period is 41.1 per cent., somewhat less than one-half; or, in other words, the odds are a little less than even in favor of his living out this period and getting married in that time. The chance of his surviving ten years and getting married in that time are 62.8 per cent., or the odds in favor of his living and getting married within this period are nearly two to one. A young woman's chances are a trifle better at age twenty. Her chances of surviving five years and getting married within this period are 50.3 per cent., or, in other words, fully even chances. Her chances for a period of ten years are 66.6, or exactly two-thirds, that is, odds in her favor

are two to one. On the other hand, at the age of twenty-five, the odds in her favor for a period of ten years are only a little better than even, and at age thirty, the odds are two to one against her living out ten years and being married within this period. In other words, from age twenty to thirty, for every five years that a young woman postpones marriage, she reduces her chances of surviving and being married within ten years by one-sixth, thus

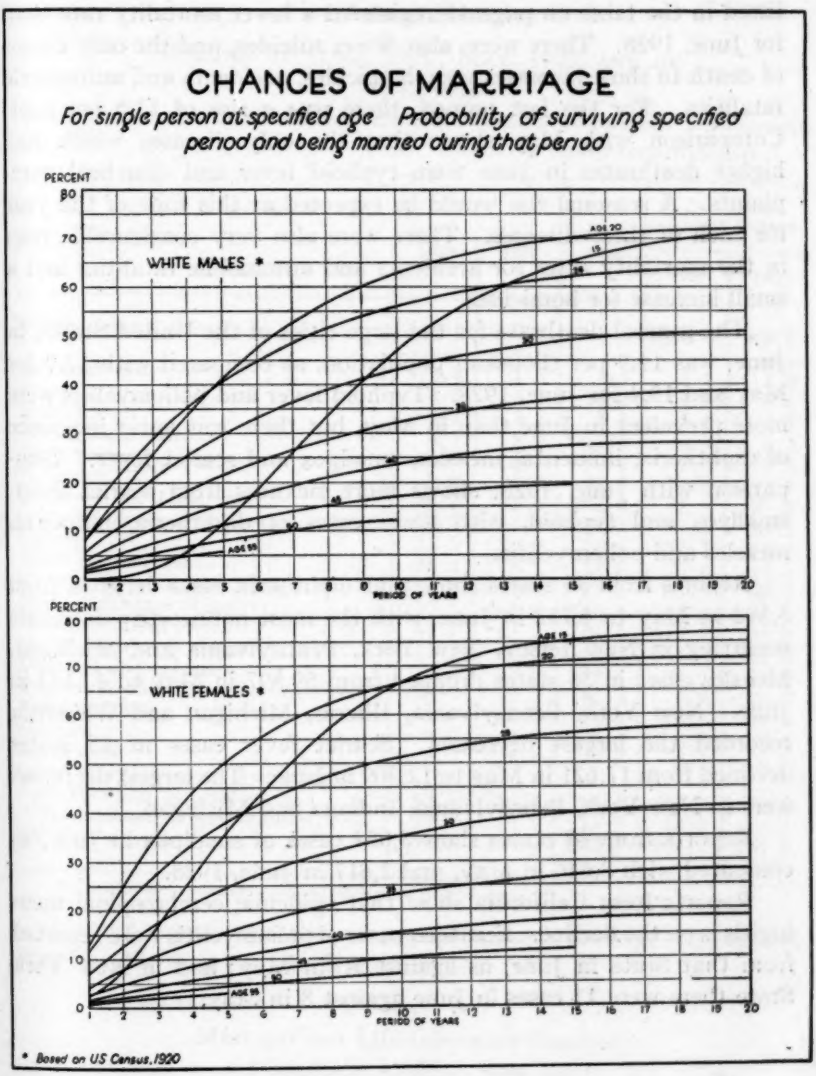
For young women 20 years old, the chance of marrying within 10 years is $^2/_3$ or $^4/_6$
For young women 25 years old, the chance of marrying within 10 years is $^1/_2$ or $^3/_6$
For young women 30 years old, the chance of marrying within 10 years is $^1/_3$ or $^2/_6$

The figures cited can all be read from the graph which shows, for every five years of life between fifteen and fifty-five the probability of surviving and being married within a period of years, from one to twenty. These drawings are almost self-explanatory. Along a horizontal line is a scale of years denoting the period of time for which the chances of survival and marriage are desired. On the vertical scale are read the corresponding chances expressed as per cents. Each curve relates to some particular age as indicated by the figures drawn against the curves, which run from fifteen to fifty-five. A study of the drawings shows that the curves for ages twenty-five to fifty-five inclusive run a somewhat similar course and do not intersect, but the earlier curves (fifteen and twenty years of age for males, fifteen years of age for females) run diagonally across. So, for example, on the diagram for females, it will be observed that the curve for age fifteen crosses that for age thirty at a point corresponding with three years on the horizontal scale. This means that a girl fifteen years old, and a young woman twice her age, thirty years old, have the same chance of marrying within three years, namely, 17 per cent., or one in six.

The reason for this is that a girl of fifteen is not very likely to marry in so short a time, for, at the end of three years, she would be only eighteen years old; on the other hand, a woman of thirty, though more likely to marry in the next three years than later, is past the age at which most marriages take place. A very similar situation exists with regard to the male sex. For the same reasons that have already been indicated, a young boy, fifteen years of age, has about the same chance of surviving and marrying within six years as a man of forty.

Comparing the diagram of females with that for males, it will be noted that the curves for females rise somewhat more sharply at the beginning than those for males, indicating the fact that women

marry, as a rule, earlier than men, that a wife is usually somewhat younger than her husband. This feature is particularly marked in the curve at age fifteen, since boys at very young ages marry only in rare and exceptional instances, whereas the marriage of girls sixteen and seventeen years old are less rare. Other features on the curves call for little comment. Naturally, the curves for the higher



ages (fifty and fifty-five) are very flat and low, indicating the fact that, at these ages, chances of marriage within any period whatsoever are small.

HEALTH RECORD FOR JUNE, 1929

The deathrate in June was the lowest ever experienced for that month among Metropolitan Industrial policyholders. Every disease listed in the table on page 11 registered a lower mortality rate than for June, 1928. There were, also, fewer suicides, and the only causes of death to show increases were homicides, accidents and automobile fatalities. For the last named, there was a rise of 13.6 per cent. Comparison with May shows that the only diseases which had higher deathrates in June were typhoid fever and diarrheal complaints. A seasonal rise would be expected at this time of the year for each of these diseases. There were also very considerable rises in the mortality rates for accidents and automobile fatalities and a small increase for homicides.

The general deathrate for the large cities of the United States, in June, was 11.9 per thousand population, as compared with 12.9 for May and 12.4 for June, 1928. Typhoid fever and poliomyelitis were more prevalent in June than in May, but there was lower incidence of diphtheria, influenza, measles, smallpox and scarlet fever. Comparison with June, 1928, shows more sickness from scarlet fever, smallpox and typhoid, with fewer cases of diphtheria, influenza. measles and poliomyelitis.

Reports from 33 states show that diphtheria cases declined from 5,592 in May to 4,752 in June, with the most noteworthy decreases occurring in New Jersey, New York, Pennsylvania and Michigan. Measles cases in 36 states dropped from 59,897 in May to 43,192 in June. New York, Pennsylvania, Illinois, Michigan and Wisconsin recorded the largest decreases. Scarlet fever cases in 45 states declined from 17,621 in May to 12,309 in June. The largest decreases were in New York, Pennsylvania, Indiana and Michigan.

Reports from 42 states show 3,054 cases of smallpox in June, as compared with 3,646 in May, and 2,617 in June, 1928.

Reports from California show that epidemic cerebrospinal meningitis is on the decline. Fourteen cases of poliomyelitis were reported from that State in June, as against 10 in May; and in New York State there were 11 cases in June against 8 in May.

The following table shows the mortality among the Industrial policyholders for June, 1929; May, 1929, and June, 1928, together with the cumulative deathrates for the first half of each year.

METROPOLITAN LIFE INSURANCE COMPANY

Deathrates* per 100,000 for Principal Causes, Premium-paying Business in Industrial Department (Annual Basis)

MONTHS OF JUNE, 1929; MAY, 1929, AND OF JUNE, 1928

CAUSES OF DEATH	RATE PER 100,000 LIVES EXPOSED*				
	June, 1929	May, 1929	June, 1928	Cumulative January to June	
				1929	1928
TOTAL—ALL CAUSES	816.1	900.1	943.6	1028.0	989.0
Typhoid fever	2.4	1.5	2.5	1.6	1.8
Measles	4.8	5.0	10.2	4.5	8.6
Scarlet fever	2.2	3.5	3.1	3.4	3.7
Whooping cough	4.7	5.0	7.4	6.3	6.2
Diphtheria	7.5	8.1	10.8	9.5	11.5
Influenza	9.9	20.3	23.8	71.9	32.7
Tuberculosis (All forms)	86.7	91.6	102.6	92.9	97.6
Tuberculosis of resp'y system	75.7	81.0	87.8	82.5	85.5
Cancer	73.5	76.9	73.9	76.2	76.0
Diabetes mellitus	13.8	18.5	17.8	20.6	19.2
Cerebral hemorrhage	50.0	55.8	55.2	61.0	60.7
Organic diseases of heart	130.1	145.0	142.7	162.6	153.4
Pneumonia (All forms)	61.1	81.2	94.1	123.7	122.0
Other respiratory diseases	11.1	11.6	16.2	14.2	14.6
Diarrhea and enteritis	16.3	13.9	21.3	14.1	16.0
Bright's disease (Chronic nephritis)	60.0	70.3	67.6	73.9	76.5
Puerperal state	11.1	12.5	14.4	14.1	14.6
Suicides	8.0	8.9	9.4	8.8	8.4
Homicides	6.2	5.6	5.8	6.2	6.4
Other external causes (excluding suicides and homicides)	63.9	56.8	61.1	58.5	57.0
Traumatism by automobiles	19.2	16.9	16.9	16.8	15.4
All other causes	192.8	208.0	203.8	204.1	201.9

*All figures include infants insured under one year of age.

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DEATHRATES
FROM ALL CAUSES

METROPOLITAN LIFE INSURANCE CO.
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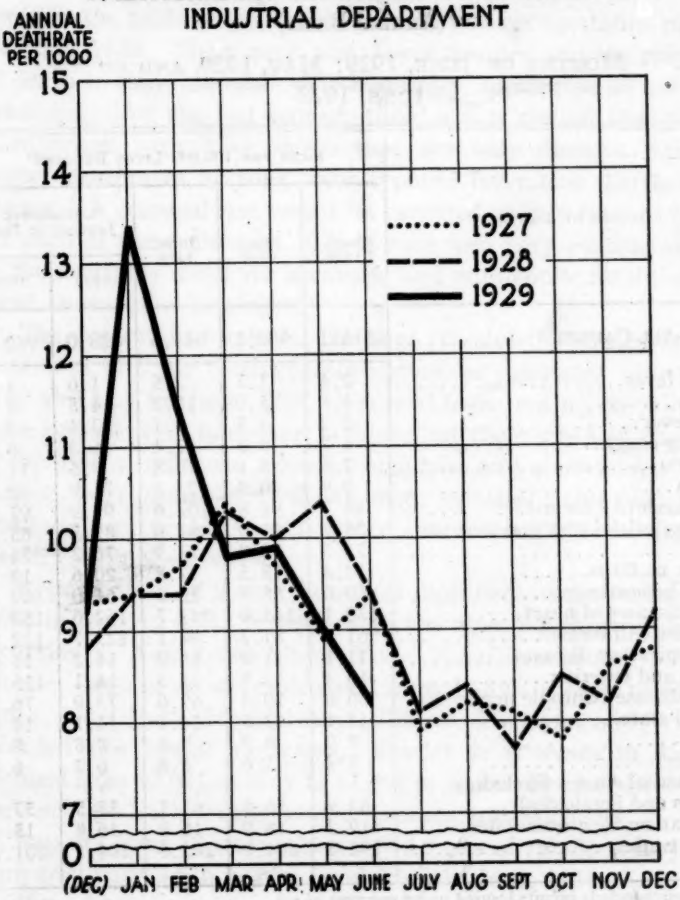

1927	9.4	9.7	10.4	9.7	8.9	9.4	7.9	8.2	8.1	7.8	8.6	8.8
1928	9.4	9.4	10.3	10.0	10.4	9.4	8.1	8.4	7.7	8.5	8.2	9.2
1929	13.4	11.4	9.8	9.9	9.0	8.2						

METROPOLITAN LIFE INSURANCE COMPANY PRESS
NEW YORK, U.S.A.
77837